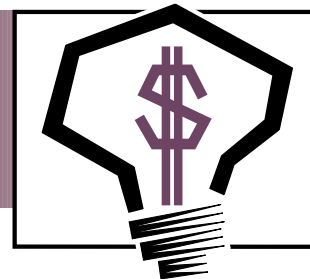


INVENTIONS & INNOVATION

Project Fact Sheet



AN INNOVATIVE APPROACH TO IMPROVED FUEL ECONOMY IN HEAVY-DUTY TRUCKS

BENEFITS

- Could save 0.69 billion Btu of diesel oil annually per installation on long-haul heavy-duty trucks
- Could save 21 trillion Btu annually by 2010
- Improves fuel economy by 20% to 25% and reduces emissions by up to 54%
- Reduces driver fatigue and need for drivers skilled in using multi-gear standard transmissions
- Maintains constant speed over varying terrain with minimal increase in rpm
- Operates at 70 miles per hour at near-idle rpm
- Adapts to unique characteristics of trucks with different engines and transmissions
- Can provide hydraulic braking

APPLICATIONS

SuperDrive uses a new, continuously variable hydraulic transmission for heavy-duty trucks and is primarily applicable to long-haul fleets that drive over 180,000 miles per truck per year. The improved fuel economy and reduced emission benefits create an immense market potential with the over 2 million trucks now operating in long-haul fleets. Tests have shown a significant fuel economy when the SuperDrive is applied to automobiles as well, but the real savings potential is with heavy-duty trucks.

A NEW SYSTEM UNCOUPLES ENGINE RPM FROM WHEEL SPEED, IMPROVING FUEL ECONOMY IN HEAVY-DUTY TRUCKS

The heavy-duty truck (class 7 and 8) market is dominated by standard-gear transmissions. The efficiency of standard transmissions is so high that there has not been much interest in exploring even greater efficiencies using other types of transmissions.

One such option to the standard transmission is the hydraulic transmission. Off-road earth-moving equipment and similar applications have used hydraulic transmissions (hydrostatics) for years. Hydrostatics for highway vehicles has not been considered feasible because hydrostatics are less efficient than standard transmissions and better suited to low-speed, high-torque applications, not to high-speed highway use.

A new technology uses an innovative approach to address this efficiency issue. The technology uses a hydraulic transmission system to uncouple engine rpm from wheel speed and then allows the electronic control module to seek the lowest rpm at which sufficient torque is available to maintain the desired speed. The improved fuel efficiency more than offsets the reduction in transmission efficiency, resulting in a 20% to 25% average increase in fuel efficiency for heavy-duty trucks and an even greater increase (50% to 55%) for light- to medium-duty trucks.

SUPERDRIVE TRANSMISSION INSTALLED ON HEAVY-DUTY TRUCK



A new technology being developed by SuperDrive, Inc., uses a new, continuously variable hydraulic transmission to improve fuel economy and reduce emissions.



Project Description

Goal: Install the SuperDrive system and data-logging equipment in 12 trucks for three to six months to sufficiently road test the technology and determine whether to go into production or to further modify the system for improved performance and reliability.

The patented SuperDrive system uses an axial piston, variable hydraulic pump that is coupled to the crankshaft at the rear of the engine. The pump drives axial-piston variable motors connected to the drive shaft. With an electronic control module, SuperDrive maintains the lowest rpm possible to produce sufficient torque to maintain required pump output. If demand increases, the fuel flow to the engine increases to meet demand, but engine speed is increased only as a last resort. This method allows the vehicle to maintain a constant speed over varying terrain with little or no increase in engine rpm. Because this is a closed-loop hydraulic system incorporating variable pumps and motors, it has the capacity for hydraulic braking by activating a flow-control valve.

SuperDrive is developing this new technology with the help of a grant funded by the Inventions and Innovation Program in the U.S. Department of Energy's Office of Industrial Technologies.

Progress and Milestones

- Outfitted prototype with the SuperDrive system.
- Tested prototype truck with supercharger.
- Studied assembly and installation process to maximize efficiency and minimize effort and time to install.
- Verified supercharger prototype of truck's performance with third-party tests.
- Install in 12 trucks from 6 different fleets for three to six months to obtain performance and reliability data.
- Redesign/change as data from extended road test are acquired.
- Develop a complete system as an engineering package with complete drawings and specifications.

Economics and Commercial Potential

The primary market for SuperDrive is the 2 million long-haul, heavy-duty trucks that accumulate over 180,000 miles per truck per year. The SuperDrive system appears to the driver as an automatic transmission with cruise control and helps lessen driver fatigue by reducing the use of the multi-gear standard transmissions.

Heavy-duty trucks consume 21 billion gallons of total fuel annually. The new system is expected to improve fuel economy by 20% to 25%. Assuming a 20% improvement in fuel economy and an average gas cost of \$1.50 per gallon, the potential savings could be \$7500 per truck annually.

This technology could save an average of 0.69 billion Btu of diesel oil per installed unit each year. First sales for the technology are expected by 2002. Based on 38% market penetration by 2010, annual savings could be 21.1 trillion Btu with 30,400 units operating. Market penetration of 76% by 2020 could save 42.2 trillion Btu from 60,800 operating units.



The Inventions and Innovation Program works with inventors of energy-related technologies to establish technical performance and conduct early development. Ideas that have significant energy savings impact and market potential are chosen for financial assistance through a competitive solicitation process. Technical guidance and commercialization support are also extended to successful applicants.

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